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Wilbur: A Low-Cost CCD Camera System for MDM Observatory

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The recent availability of several "off-the-shelf" components, particularly CCD control electronics from SDSU, has made it possible to put together a flexible CCD camera system at relatively low cost and effort. We describe Wilbur, a complete CCD camera system constructed for the Michigan-Dartmouth-MIT Observatory. The hardware consists of a Loral 2048<sup>2</sup> CCD controlled by the SDSU electronics, an existing dewar design modified for use at MDM, a Sun Sparcstation 2 with a commercial high-speed parallel controller, and a simple custom interface between the controller and the SDSU electronics. The camera is controlled from the Sparcstation by software that provides low-level I/O in real time, collection of additional information from the telescope, and a simple command interface for use by an observer. Readout of the 2048<sup>2</sup> array is complete in under 2 minutes at 5 e<sup>-</sup> read noise, and readout time can be decreased at the cost of increased noise. The system can be easily expanded to handle multiple CCDs/multiple readouts, and can control other dewars/CCDs using the same host software.